

Article 19

WHAT IS CLAIMED IS:

1. A driving circuit of a DC microwave oven having an inverting unit for converting a DC voltage of a DC power supply into an AC voltage by driving pulses, a high voltage transformer for transforming the AC voltage applied by the driving of the inverter unit and supplying the transformed AC voltage to a magnetron, and a pulse driving unit for generating the driving pulses, comprising:

an excessive current detecting unit for detecting a current supplied from the DC power supply to the inverting unit, and outputting an excessive current detecting signal to the pulse driving unit to cut off the generation of the driving pulses of the pulse driving unit if the detected current corresponds to an excessive current.

2. The driving circuit as claimed in claim 1, wherein the excessive current detecting unit includes:

15 an excessive current detecting part for detecting a current supplied to the inverting unit; and

a comparison part for comparing a detecting signal outputted from the excessive current detecting part with a predetermined reference signal, and outputting a comparison result signal, wherein the pulse driving unit stops the generation of the driving pulses if the comparison result signal of the comparator corresponds to the excessive current detecting 20 signal.

3. The driving circuit as claimed in claim 2, further comprising:

an amplification part for amplifying the detecting signal outputted from the excessive current detecting part and applying the amplified detecting signal to the comparator.

4. The driving circuit as claimed in claim 2, wherein the excessive current detecting part includes plural bipolar transistors driven in the same periods as the inverting unit with an input of the driving pulses.

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5. The driving circuit as claimed in claim 1, further comprising:
an excessive current maintaining unit for continuously maintaining the excessive current detecting signal if the excessive current detecting signal occurs from the excessive current detecting part.

6. The driving circuit as claimed in claim 5, wherein the excessive current maintaining unit includes:

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a feedback transistor turned on with an input of a feedback control signal outputted from the pulse driving unit; and

a diode connected between the comparator and the feedback transistor to continuously output to the comparator the feedback signal higher than a reference signal in correspondence with the turn-on of the feedback transistor, the pulse driving unit outputting the feedback control signal in response to the excessive current detecting signal of the comparator.

7. A driving circuit of a DC microwave oven having an inverting unit for converting a DC voltage of a DC power supply into an AC voltage by driving pulses, a high voltage transformer for transforming the AC voltage applied by the driving of the inverting unit and supplying the transformed AC voltage to a magnetron, and a pulse driving unit for generating the driving pulses, comprising:

5 a switching unit mounted to turn on and off the voltage supply to the pulse driving unit according to the opening and closing operations of a cooking chamber door, the switching unit comprising:

10 a door sensing switch turned on and off according to the opening and closing operations of the cooking chamber door;

15 a primary interlock switch connected in the voltage supply path to the voltage input terminal of the pulse driving unit to be turned on and off according to the opening and closing operations of the cooking chamber door; and

20 a secondary interlock switch connected in series with the primary interlock switch in the voltage supply path to the voltage input terminal of the pulse driving unit to be turned on and off according to the switching states of the door sensing switch.

8. The driving circuit as claimed in claim 7, further comprising:

25 a voltage regulator for regulating the DC voltage of the DC power supply and supplying the regulated DC voltage to the voltage input terminal of the pulse driving unit through the primary interlock switch and the secondary interlock switch.

9. A driving circuit of a DC microwave oven having an inverting unit for converting a DC voltage of a DC power supply into an AC voltage by driving pulses, a high voltage transformer for transforming the AC voltage applied by the driving of the inverting unit and supplying the transformed AC voltage to a magnetron, and a pulse driving unit for generating
5 the driving pulses, comprising:

a switching unit mounted to turn on and off the voltage supply to the pulse driving unit according to the opening and closing operations of a cooking chamber door; and

10 a switch monitor unit for cutting off the supply of the DC voltage to the high voltage transformer when the cooking chamber door is in the open state.

15 10. The driving circuit as claimed in claim 9, wherein the switch monitor unit includes:

a plurality of monitor switches mounted in a position capable of short-circuiting the primary coil of the high voltage transformer, and switched on and off according to the opening and closing operations of the cooking chamber door; and

15 a fuse mounted in a voltage supply path through the plural monitor switches and the DC power supply.

20 11. The driving circuit as claimed in claim 10, wherein one ends of the plurality of monitor switches are connected to the DC power supply through the fuse, and the other ends of the same are connected between the inverting unit and the primary coil of the high voltage transformer.

12. The driving circuit as claimed in claim 9, further comprising:

an excessive current detecting/maintaining unit for detecting a current occurring from the DC power supply through the switch monitor unit, and outputting an excessive current detecting signal to the pulse driving unit to cut off the occurrence of the driving pulses of the pulse driving unit if the detected current corresponds to an excessive current.

13. The driving circuit as claimed in claim 12, wherein the switch monitor unit includes a three-terminal monitor switch for selecting either of a first loop connecting the DC power supply and the fuse, or of a second loop connected to the excessive current detecting/maintaining unit by the switching operations.

14. The driving circuit as claimed in claim 12, wherein the excessive current detecting/maintaining unit includes:

15 an excessive current detecting part for detecting a current supplied to the inverting unit;

a comparison part for comparing the detecting signal outputted from the excessive current detecting part with a predetermined reference signal and outputting a comparison result signal; and

20 a feedback part for outputting to the comparison part a feedback signal exceeding the reference signal in the control of the pulse driving unit.

15. The driving circuit as claimed in claim 14, further comprising:
an amplifying unit for amplifying the detecting signal outputted from the excessive current detecting part and applying the amplified detecting signal to the comparison part.

5 16. A driving circuit of a DC microwave oven having an inverting unit for converting a DC voltage of a DC power supply into an AC voltage by driving pulses, a high voltage transformer for transforming the AC voltage applied by the driving of the inverting unit and supplying the transformed AC voltage to a magnetron, and a pulse driving unit for generating the driving pulses, comprising:

a switch monitor unit for cutting off the supply of a voltage to the high voltage transformer from the DC power supply when a cooking chamber door is in an open state.

17. The driving circuit as claimed in claim 16, wherein the switch monitor unit includes:

15 a plurality of monitor switches mounted in a position capable of short-circuiting the primary coil of the high voltage transformer and switched according to the opening and closing operations of the cooking chamber door; and

a fuse mounted in a voltage supply path connecting the plurality of monitor switches and the DC power supply.

20 18. The driving circuit as claimed in claim 17, wherein the one ends of the plurality of monitor switches are connected with the DC power supply through the fuse, while the other

ends thereof are connected between the inverting unit and the primary coil of the high voltage transformer.

19. The driving circuit as claimed in claim 16, further comprising:

5 an excessive current detecting/maintaining unit for detecting a current generated from the DC power supply through the switch monitor unit, and outputting an excessive current detecting signal to the pulse driving unit to cut off the generation of the driving pulses of the pulse driving unit.

10 20. The driving circuit as claimed in claim 19, wherein the switch monitor unit includes a three-terminal monitor switch for selecting either of a first loop connecting the DC power supply and the fuse, or of a second loop connected to the excessive current detecting/maintaining unit by the switching operations.

15 21. The driving circuit as claimed in claim 19, wherein the excessive current detecting/maintaining unit includes:

20 an excessive current detecting part for detecting a current supplied to the inverting unit; a comparison part for comparing the detecting signal outputted from the excessive current detecting part with a predetermined reference signal and outputting a comparison result signal; and

a feedback part for outputting to the comparison part a feedback signal exceeding the reference signal in the control of the pulse driving unit.

22. The driving circuit as claimed in claim 21, further comprising:

5 an amplifying unit for amplifying the detecting signal outputted from the excessive current detecting part and applying the amplified detecting signal to the comparison part.

10 23. A driving method of a DC microwave oven having an inverting unit for converting a DC voltage of a DC power supply into an AC voltage by driving pulses, a high voltage transformer for transforming the AC voltage applied by the driving of the inverting unit and supplying the transformed AC voltage to a magnetron, a pulse driving unit for generating the driving pulses, and a switching unit for switching on and off the voltage supply to the pulse driving unit from the DC power voltage, comprising steps of:

15 a) driving the pulse driving unit by controlling the switching unit if a cooking chamber door is closed and a cooking start selection signal is inputted;

b) detecting whether an excessive current is supplied to the high voltage transformer through the inverting unit driven by the pulse driving unit; and

c) cutting off the voltage supply to the magnetron by stopping the driving of the pulse driving unit if the excessive current is detected.

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24. The driving method as claimed in claim 23, further comprising a step of:

d) forming a voltage supply path in parallel with the high voltage transformer if the cooking chamber door is opened in the state that the excessive current is not detected, and opening the voltage supply to the inverting unit from the DC power supply if an excessive current flows in the voltage supply path formed in parallel.

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25. The driving method as claimed in claim 24, wherein a three-terminal monitor switch is provided, the fixed terminal thereof is connected in the voltage supply path connecting the inverting unit and the high voltage transformer, a first contact thereof selectively switched to the fixed terminal is connected to the DC power supply through the fuse, and a second contact thereof selectively switched to the fixed terminal is connected to a unit for carrying out the detection of the excessive current when the cooking chamber door is closed, the fixed terminal being switched on to the second contact in the step b), and the fixed terminal being switched on to the first contact in the step d).